

# PATENT SPECIFICATION

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(19)



## (54) IMPROVEMENTS IN COVERS FOR LEVITATION BEDS

(71) We, HOWORTH AIR CONDITIONING LIMITED, Victoria Works, Lorne Street, Farnworth, Bolton, County of Lancaster, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to improvements in levitation air beds for medical purposes.

Levitation beds in which the occupant is suspended on an air cushion are made for patients suffering from severe burns or other pressure sensitive afflictions.

The bed is an inflatable chamber with an outlet formed by a number of pockets which are self-adjusting in three planes. As each pocket inflates, it is forced against its neighbour and it also meets the opposite pocket along the central longitudinal axis of the bed. After the patient has been put on the inflated bed the pressure is adjusted so that the pockets are depressed sufficiently by the downward thrust of the body to allow pressurised air to leak between the body and the top surface of the pockets. These portions of the pockets beneath the body are subject to the same pressures on their inner and outer surfaces and thus fall away from the patient while those portions outside the body profile remain inflated.

Air from a conditioning unit is supplied to the bed through a range of ducting which incorporates a control system. Incorporated into the control system is a modulating damper which is set to give the correct pressure to levitate the patient and the pressure can be sensed either in the bed or in the air supply duct just before the bed.

The object of the invention is to provide a controlled, ambient environment for the patient, by applying a cover supported on a framework over the bed and the patient. The conditioned air escaping from under the patient being largely contained under this cover.

According to the invention a levitation bed unit for hospital use comprises a wheeled frame on which a levitation bed is

mounted, a second frame supporting a cover, the cover, when in position, and the underlying bed support frame defining a chamber to accommodate the patient and a plenum chamber above the bed with a fan for blowing air from the plenum chamber through a filter and over heating units on to the patient.

The invention will be described with reference to the accompanying drawings:

Figure 1 is an end elevation of a bed unit.

Figure 2 is a side elevation of same.

Figures 3 and 4 are similar views to Figures 1 and 2 of a further arrangement.

Figures 5 and 6 are similar views of a still further arrangement, Figure 6 showing the cover pivoted to an open position.

A levitation bed as shown on Figures 1 and 2 is mounted in a substantially rectangular supporting frame 1 mounted on wheels or casters 2. A second frame 3 mounted on wheels or casters 4 surrounds the bed and supports a cover. The top of the frame 3 is enclosed by the cover 5. The cover 5 and the underlying bed support frame define a substantially trapezium shaped chamber for accommodating the patient.

The chamber 10 is provided with pivoted panels 6 hinged to a horizontal ceiling 7 forming the base of a plenum chamber 8 housing a lighting and radiant heat unit 9. The ceiling 7 is transparent and has a filter panel for air circulated downwards therethrough by a fan. The panels 6 may be provided with a skirt 11 affixed along the lower free edge of the panels to prevent escape of air from the chamber 10 defined within the cover in order to maintain the air pressure around the patient. The foot end of the cover 5 is preferably closed by an end plate affixed to inclined supports supporting one end of the ceiling 7. The head end of the frame 3 is provided with further inclined supports for hinges for the panels 6 and to support the ceiling 7, and closed by a drape 12, the lower edges of

which is arranged over the patient.

Air is supplied to the pockets in the levitation bed through pipes A and is

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exhausted through a duct A' at the foot end.

The panels 6 may be pivoted into the position as shown by dotted lines in Figure 1 to give access to the patient.

In the arrangement shown in Figures 3 and 4 the levitation bed frame 1 is pivoted on a wheeled frame 1a on a rod 13 to enable the end to be tipped to raise the patients head for drinking. The chamber 10 beneath the cover 5 as in the previous arrangement is supplied with air from a plenum chamber 8 circulated by a variable flow fan 14 over the heating unit 9 and passes vertically downwards through the filter panel 7a and is recirculated by the fan 14 through grills 16 at the foot end of the bed. The heated air passes vertically downwards through the filter 7a onto the patient A support 15 on the frame 1 when in the horizontal position rests on a support 15a.

The air heating unit 9 is incorporated in the plenum chamber 8 which may either draw its air from under the cover 5 and recirculate the air into the cover via an electric heater, or it may draw air from a source outside the cover or a combination of both arrangements.

Excess air escapes around the lower edges of the skirt 11 and/or through the apertures adjacent to the lighting and radiant heat unit 9. Alternatively, some excess air may be ducted to outside the room through a duct to allow a cooler temperature for the comfort of the nursing staff. A plenum is always maintained under the cover by the bed air supply.

Alternatively, the second frame 3 may be suspended from above and the covering material of the panels may be rigid or flexible, transparent or opaque, reflective or non-reflective.

In the arrangement shown in Figures 5 and 6 the cover 5a is pivoted along one side of an L-shaped frame 3a which supports the cover on pivots 17 and may be raised as shown in dotted lines in Figure 5 to give access to the patient and to allow the bed to be pivoted to raise the patients head as described with reference to Figures 3 and 4.

The heated air passes vertically downwards through the filter 7h mounted in the ceiling 7 onto the patient.

The cover 5a is counter balanced by a weight 18 and may be raised and lowered. The height of the cover above the bed may be adjusted by a handle 19 operating a pinion engaging a rack or by other means. When the cover 5a is lowered air is circulated through the plenum chamber 8

by the fan 1 and over the patient and is returned through grills 16 situated along one side of the bed.

The cover 5a carried on an L-shaped frame 3a may be wheeled to a position in which the cover lies over the bed frame 1 (Figure 5).

The control of the air supply to the bed through the ducts A may be as described in the specification of our pending application No. 19131773.

In all the arrangements a filter is incorporated in the reheat air system.

#### WHAT WE CLAIM IS:-

1. A levitation bed unit for hospital use comprising a wheeled frame on which a levitation bed is mounted, a second frame supporting a cover, the cover, when in position, and the underlying bed support frame defining a chamber to accommodate the patient and a plenum chamber above the bed with a fan for blowing air from the plenum chamber through a filter and over heating units onto the patient.

2. A levitation bed unit as in Claim 1 in which the filter is mounted in a ceiling plate of the cover forming a base for the plenum chamber, pivoted panels forming part of the cover being hinged to the ceiling plate to give access to the patient.

3. A levitation air bed unit as in Claim 1 or 2 in which the second frame is mounted on wheels or casters for positioning the cover over the levitation bed frame and means for restricting the escape of air along two sides and the foot end of the frames and a drape for closing the head end of the second frame.

4. A levitation air bed unit as in Claim 1, in which the bed frame is pivotable about a transverse axis to raise the head end of the bed and in which the fan circulates air through the plenum chamber in the cover and over the patient through the filter panel in the ceiling and the air is returned through grills to the fans.

5. A levitation bed as in Claim 1 in which the cover is pivoted along one side and including means for counter balance the cover and means for raising and lowering the cover relatively to the bed frame.

6. A levitation air bed for medical purposes substantially as described with reference to Figures 1 and 2, Figures 3 and 4, and Figures 5 and 6 of the accompanying drawings.

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**1461383 COMPLETE SPECIFICATION**

**3 SHEETS** This drawing is a reproduction of  
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Sheet 1

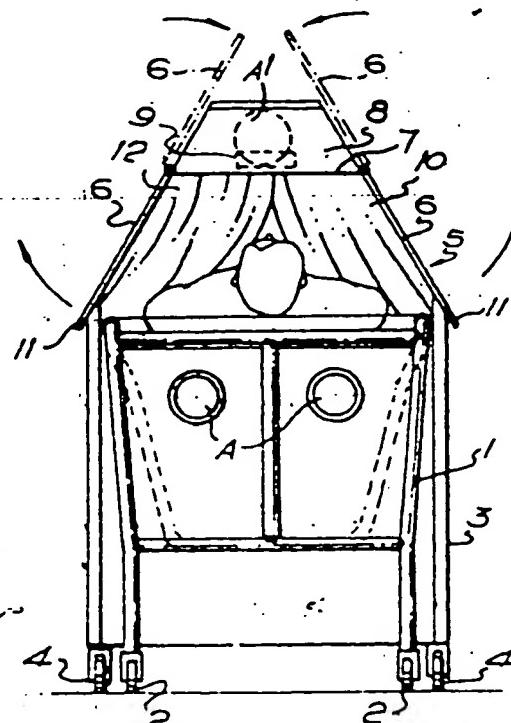


FIG. 1

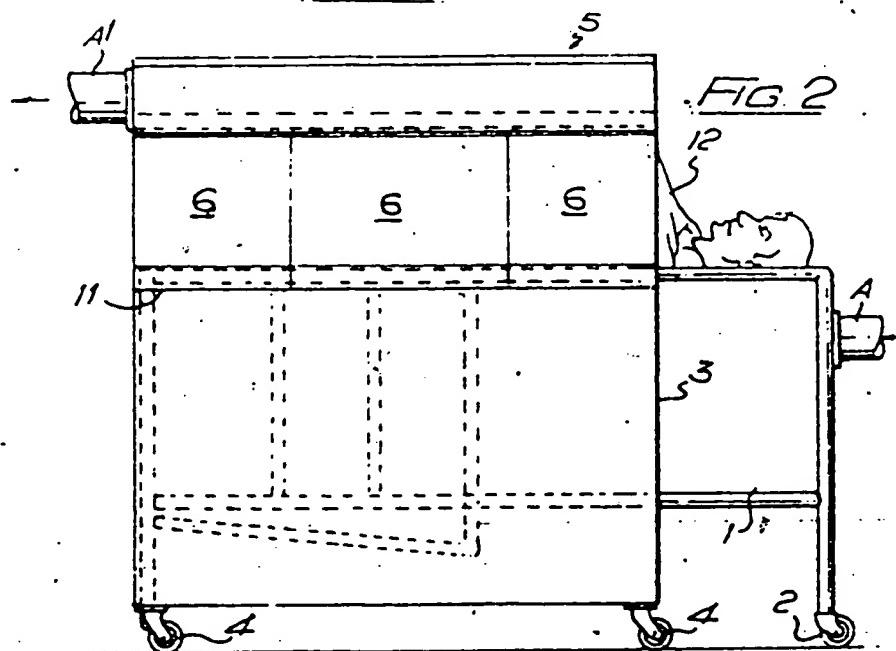


FIG. 2

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Sheet 2

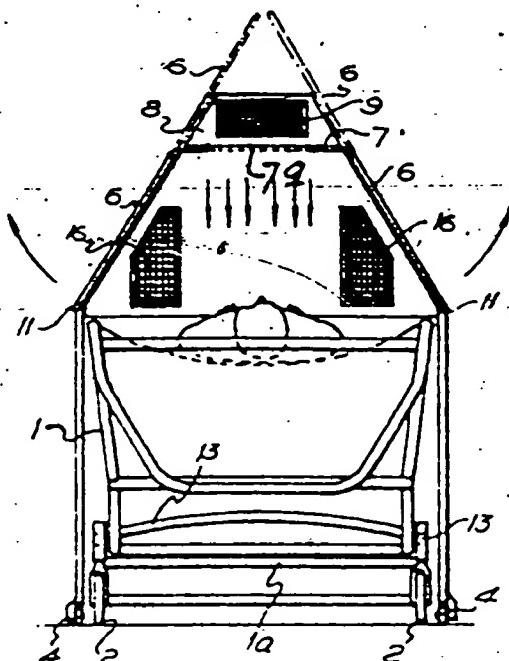


FIG 3

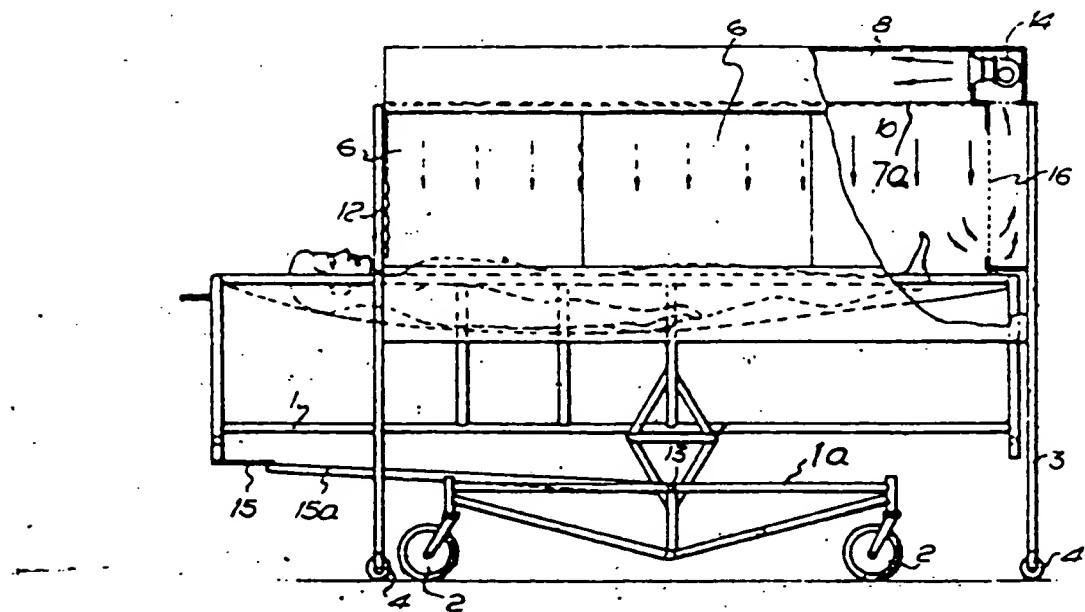


FIG 4.

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Sheet 3

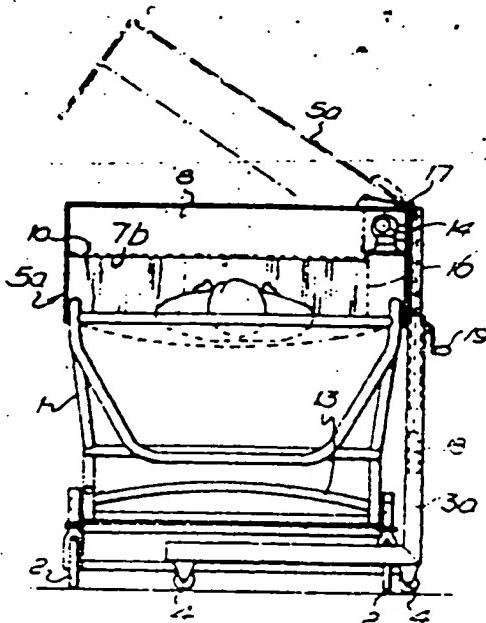


FIG 5

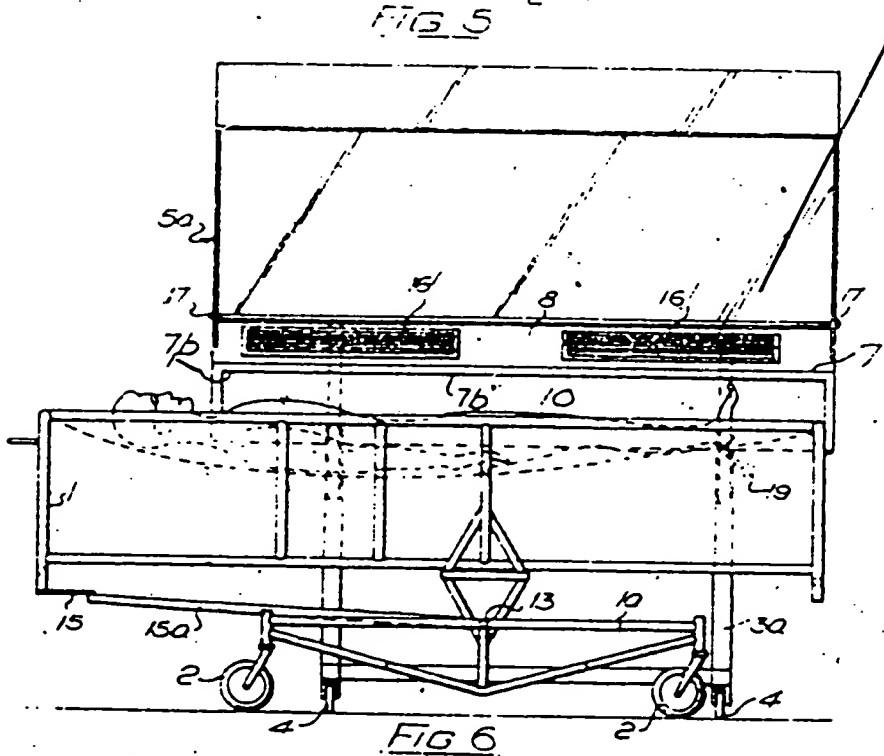


FIG 6